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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/927,718	08/10/2001	Owen H. Bailey	DP-302920	6362

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EXAMINER	
SODERQUIST, ARLEN	

ART UNIT	PAPER NUMBER
1743	

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/927,718	BAILEY ET AL.	
	Examiner	Art Unit	
	Arlen Soderquist	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 January 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-8 and 10-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26-29* is/are allowed.

6)☒ Claim(s) *1,4-7 and 10-25* is/are rejected.

7)☒ Claim(s) *8,30 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ~~1-8-04~~ 12/8/03
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1,4-7,10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn (US 5,974,788) in view of Itou (US 5,461,857, newl cited and applied). In the patent Hepburn teaches method and apparatus for desulfating a NO_x trap in an automobile exhaust system. The SO_x (desulfating) purge temperature is achieved by modulating the amplitude of the A/F of the mixture supplied to the engine thereby storing oxygen in the trap during lean engine cylinder events and generating the required exotherm during rich engine cylinder events. The exhaust system (22), comprising one or more exhaust pipes and an exhaust flange (24) transports exhaust gas produced from combustion of an air/fuel mixture in the engine to a conventional three-way catalytic converter (TWC, 26). The converter contains catalyst material that chemically alters the exhaust gas to generate a catalyzed exhaust gas. A heated exhaust gas oxygen (HEGO) sensor (28) detects the oxygen content of the exhaust gas generated by the engine (18) and transmits a representative signal to the electronic engine controller (EEC, 20). A NO_x trap (32) is located downstream of the converter for trapping nitric oxide contained in the exhaust gas exiting the converter. A HEGO sensor (34) detects the oxygen content of the exhaust gas upstream of the trap while a HEGO sensor (36) detects the oxygen content of the exhaust gas downstream of the trap. The sensors transmit signals to the EEC. The NO_x trap contains a temperature sensor (42) for measuring the midbed temperature which is provided to the EEC. Other sensors (46) provide additional information about engine performance to the

EEC such as crankshaft position, angular velocity, throttle position, air temperature, etc. The information from these sensors is used by the EEC to control engine operation. This information is used to determine when the amount of sulfer deposited on the NO_x trap has reached a point that it needs to be removed by heating above the normal operating temperature. During the desulfation process, the A/F ratio and spark advance are controlled. The A/F ratio span determines the exotherm in the trap. However, the spark advance is preferably controlled to avoid power surges and sags during the desulfation. During the lean A/F desulfation event, the spark advance is adjusted to MBT. During the rich desulfation event, the spark advance is retarded. The desulfation process is started with lean modulation, to store oxygen in the trap. After the trap's oxygen storage capacity is attained, the A/F is switch rich. During the rich half of the event, a catalytic exotherm is generated in the trap, raising its temperature. After the temperature reaches the desired temperature, say 650°C, and remains at the desired temperature for a prescribed time during which the A/F is biased rich, the desulfation event is terminated. Columns 5-6 teach how the determination is made to start the desulfation process. Column 2, lines 63-64 teach that the trap operates in a temperature window of 300-400°C for good efficiency. Hepburn does not teach that the two exhaust treatment devices contain nitrogen oxides absorber material.

In the patent Itou teaches an engine exhaust purification device. Figure 1 teaches one embodiment of the device which includes a catalytic converter (18) having an electrically heated three way catalyst (17) therein, a catalytic converter (21) having an electrically heated oxidizing catalyst (20) therein and a casing (25) having a pair of NO_x absorbents (23-24, two separate treatment devices) therein. Column 6, line 53 to column 7 line 30 teaches that although the NO_x absorbents (23-24) perform the absorbing operation of NO_x as mentioned above, the absorption rate of NO_x of the NO_x absorbents has temperature characteristics which change in accordance with kinds of metals carried on the carrier. As illustrated in figure 8, the Pt--Ba absorbent formed by the combination of platinum Pt and barium Ba, has an absorption rate for NO_x that becomes maximum in a middle temperature ranging from 200 to 500°C. Conversely, the Pt--Ba--Fe absorbent formed by the combination of platinum Pt, barium Ba and iron Fe, has an absorption rate for NO_x that becomes maximum in a low temperature below 200°C. For example, in the Pt--Ba absorbent, if the temperature of the absorbent becomes low, the oxidizing

reaction of NO_x on the surface of platinum Pt does not proceed and, in addition, the absorption speed of NO_x into the absorbent becomes low. As a result, the absorption rate of NO_x drops. Conversely, if the temperature of the absorbent becomes high, nitrite in the absorbent is dissolved, and NO_x is released from the absorbent. As a result, the absorption rate of NO_x drops. However, the relationships between the temperature and the oxidizing reaction of NO_x, between the temperature and the absorbing operation of NO_x and between the temperature and the dissolving operation of nitrite change in accordance with the kinds of metals carried on the carrier. In this way it is preferable to use the NO_x adsorbents (23,24) having different temperature characteristics. Thus, in the embodiment illustrated in figure 1, a NO_x absorbent such as the Pt--Ba--Fe absorbent having the maximum absorption rate of NO_x at a low temperature is used as the first NO_x absorbent (23), and a NO_x absorbent such as Pt--Ba absorbent having the maximum absorption rate of NO_x at a middle temperature is used as the second NO_x absorbent (24). By arranging the NO_x adsorbents in series in this order, NO_x can be absorbed in the NO_x adsorbents (23-24) over a wide range of the operating states of the engine from the start of the engine at which the temperature of the exhaust gas is low to the high load operating state in which the temperature of the exhaust gas becomes high.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the plural NO_x trapping materials as taught by Itou into the Hepburn device and method because of the ability to operate the system over a wide range of engine operating conditions as taught by Itou.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn in view of Itou as applied to claim 1 above, and further in view of Daudel (US 5,369,956). Hepburn teaches a temperature sensor for the NO_x trap but does not teach another type of sensor disposed within the treatment device.

In the patent Daudel teaches an exhaust gas aftertreatment device for internal combustion engines having a catalyzer for the selective catalytic reduction of oxides of nitrogen from exhaust gases of motor vehicle diesel engines, provides overstoichiometric supply of NH_3 or materials releasing NH_3. A first sensor records the NH_3 concentration contained in the exhaust gas and interrupts the supply of the NH_3 quantity when a specified upper threshold value is reached.

A second sensor records the NH_3 adsorbed in the catalyzer, by way of which the NH_3 supply is resumed on reaching a specified lower threshold value. Alternatively, only one NH_3 sensor is provided in the exhaust gas aftertreatment device. The NH_3 concentration determined by this single sensor is compared, as the actual value, with a required value corresponding to a specified NH_3 concentration in order to form a correction signal which is used for triggering the metering appliance continuously connected into the gas phase.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a sensor disposed within the treatment device of Hepburn because of the ability to measure the concentration of the thing being stored by the treatment device with the device as taught by Daudel.

4. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn in view of Itou as applied to claim 10 above, and further in view of Höhne. Hepburn does not teach measuring the nitrogen oxide storage capacity directly.

In the patent Höhne teaches a process for the operation of a nitrogen oxides storage catalyst. Column 3 teaches a prior art device and method in which the determination of the nitrogen oxide storage capacity from the measured oxygen storage capacity to determine when regeneration of the catalyst is need.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the nitrogen oxides storage capacity from the measured oxygen storage capacity in the Hepburn method because of the ability to determine the need to regenerate the catalyst as taught by Höhne.

5. Claims 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn in as discussed above in view of Hamburg (US 5,077,970). Hepburn teaches that preferably breakthrough is minimized for the trap, but does not teach detecting emissions breakthrough.

In the patent Hamburg teaches a method of on-board detection of automotive catalyst degradation in which a plurality of sensors (12,20) are used to monitor the state of the catalyst (21). Figures 8 and ten show examples of signal from the sensors is used to detect the occurrence of breakthrough in the catalyst and the degradation state of the catalyst.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the breakthrough in the Hepburn method as taught by Hamburg because of the ability to monitor the catalyst degradation as taught by Hamburg.

6. Claims 8 and 30-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The art of record fails to teach or fairly suggest the structure as defined by the claims.

7. Claims 26-29 are allowed for the reasons of record.

8. Applicant's arguments filed January 8, 2004 have been fully considered but they are not persuasive. Relative to claims 1, 10 and the claims dependent therefrom, the new ground of rejection clearly shows the use of two treatment devices having NO_x absorbing material therein. It should also be pointed out that TWC catalysts can contain NO_x absorbing material. For examples of this see the newly cited Suga (column 5, lines 10-23) and Hepburn (column 5, line 29-51). Relative to claims 20-25, the Hepburn reference clearly is concerned with breakthrough but fails to teach means to measure the breakthrough. Thus the Hamburg reference teaches means to and reasons for monitoring breakthrough which would suggest the incorporation of those means into the Hepburn system and method.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art has been described above or is the correct citation of the Donelon reference. Relative to the search report, examiner has considered the references cited therein. Since the search report is not a reference and cannot be used as a reference, it will not be listed on the patent.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose current telephone number is (571) 272-1265 as a result of the examiner moving to the new USPTO location. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

A general phone number for the organization to which this application is assigned is (571) 272-1700. The fax phone number to file official papers for this application or proceeding is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arlen Soderquist

April 2, 2004

ARLEN SODERQUIST
PRIMARY EXAMINER